1058-124 Cardiovascular Outcomes After First-Ever Treatment of Hypertension With Angiotensin Converting Enzyme Inhibitors or Calcium Channel-Blockers in Primary Care

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Background: At the Glasgow Blood Pressure Clinic, a secondary and tertiary referral centre, treatment with ACE inhibitors (ACEI) is associated with cardiovascular mortality lower than that following calcium channel blocker (CCB) treatment. The purpose of this study was to compare cardiovascular outcomes in patients receiving these drug classes in primary care.

Methods: The United Kingdom General Practice Research Database contains validated demographic diagnostic and prescription information on 3.5 million patients in primary care. From these, we identified a priori a representative sample of 105,965 treated hypertensives eligible for a retrospective cohort analysis. Only those who received ACEI (n = 11249) or CCB (n = 12494) as first-ever therapy between 1988 and 1998 and without evidence of cardiovascular disease prior to treatment were included. Cardiovascular outcome rates in ACEI and CCB during an average of 6 years follow-up were compared as relative hazard ratios (RHR) with 95% confidence intervals (CI) using Cox proportional hazard model with adjustment for age, gender and year of entry.

Results: Compared with CCB, first-line treatment of hypertension with ACEI was associated with highly significant reductions in cardiovascular outcomes - RHR for coronary artery disease, 0.63 (95% CI 0.58, 0.68) and for cerebrovascular events, 0.87 (95% CI 0.78, 0.97). A trend in favour of ACEI was also seen for heart failure, RHR 0.90 (95% CI 0.81, 1.00). As 25% in each group subsequently received treatment with a drug from the other class, differences may have been underestimated. CCB treated patients included more smokers (19% vs 14%) and fewer diabetics (13% vs 16%) but the treatment groups were well balanced for other risk factors. Achieved systolic blood pressure was lower (1.6 mmHg) and diastolic blood pressure higher (1.4 mmHg) in ACEI treated patients. Adjustment for these imbalances did not alter importantly the RHRs.

Conclusions: Compared with CCB, treatment of hypertension with ACEI in primary care is associated with a lower rate of cardiovascular outcomes. The findings are not easily explained by differences in blood pressure control or other risk factors.

1058-125 Is Central Aortic Systolic Pressure Augmentation Solely Due to Pressure Wave Reflection?

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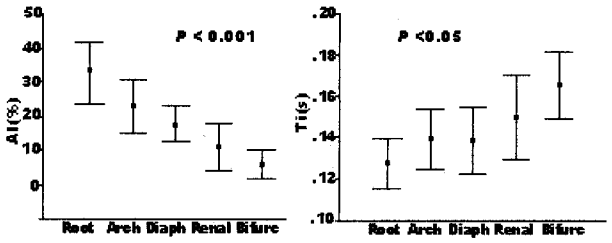
Background: The augmentation of central aortic systolic pressure, associated with increasing age and cardiovascular mortality, is widely believed to result from pressure wave reflection from the distal aorta or its branches. According to this hypothesis the time to the inflection point (Ti), marking the putative onset of the influence of a reflected pressure wave, would be expected to decrease, and augmentation index (AI) to increase with distal progression. This hypothesis has yet to be tested with directly measured pressure waveforms from different sites within the aorta.

Methods: Aortic pressure waveforms were measured using 2F Millar pressure transducer-tipped catheters in 20 patients (12 male) at 5 pre-determined points within the aorta: aortic root, transverse arch, at the levels of the diaphragm, renal arteries and aortic bifurcation. Waveforms were analysed for AI and Ti. The data were analysed by repeated measures analysis of variance.

Results: AI decreased progressively between the aortic root and bifurcation ($P < 0.001$) (figure), and Ti increased ($P < 0.05$). Despite this, as expected there was progressive peripheral amplification of systolic and pulse pressures and a fall in the time to peak pressure (all $P < 0.001$). There was no difference between genders.

Conclusion: These data are at variance with the concept that central systolic pressure augmentation results only from pressure wave reflection. Pressure wave propagation phenomena may be important.



1058-126 Greater Error in Noninvasive Transfer Function-Derived Central Aortic Systolic Pressure in Type 2 Diabetes Mellitus

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Background: There is theoretical benefit in the assessment of central aortic rather than brachial artery systolic pressure. Optimal blood pressure control in subjects with diabetes mellitus reduces the risk of cardiovascular complications. Thus assessment of central aortic pressure may offer greater benefit, but the method has yet to be evaluated, in diabetes.

Methods: Simultaneous invasive central aortic and non-invasive radial waveforms (applanation tonometry, Millar® Mikro-tip® tonometer) were acquired in 19 subjects with type II diabetes and applied to a single-input/single-output method for the derivation of a transfer function (TF). Individual TFs were averaged to yield a diabetes-specific TF (DTF). Similar data were also acquired from 38 age and sex-matched non-diabetic subjects. A generalised TF (GTF) was applied to the radial data from all subjects, and the DTF to each diabetic subject to yield reconstructed central aortic waveforms. Measured and reconstructed aortic waveforms were analysed for parameters of potential clinical value, including pressures, augmentation index and systolic and diastolic pressure time integrals.

Results: There was no difference between the groups in systolic, or any other directly measured central aortic pressures. However, the time to inflection was shorter in the diabetics ($P < 0.05$), with a trend to a higher augmentation index ($P < 0.09$). There was a significantly greater difference between measured and GTF-derived central systolic pressure in the diabetic (6 ± 7 mmHg) (mean ± SD) than the non-diabetic group (2 ± 8 mmHg) ($P < 0.05$)). The errors in the other waveform parameters were no different. The use of the DTF reduced the error in derived systolic pressure to 0 ± 7 mmHg in the diabetic group, no different than with the GTF in the non-diabetic group.

Conclusion: There is increased error in the derivation of central aortic systolic pressure in subjects with type II diabetes mellitus with the use of a generalised TF. This error is substantially reduced by the use of a diabetes-specific TF. A generalised TF is inappropriate for the derivation of central aortic waveforms in subjects with type II diabetes.

1058-127 Monitoring and Improving Hypertension Using the Veterans Administration Electronic Medical Record: A 48-Month Review

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Background: The Computerized Patient Record System (CPRS) was installed at all 172 Department of Veterans Affairs Medical Centers (VAMCs). At the Washington, DC VAMC, database vital signs have been queried to identify patients with hypertension. **Methods:** The CPRS database was examined for hypertensives, defined by at least 1 outpatient encounter in the previous 6 months, and 3 or more prior elevated Blood Pressures (BP) on 3 different days. Routine reports characterized these patients' most recent BP as normal, mildly elevated (≥140/90, < 160/100), or severely elevated (≥ 160/100). Reports included names and pending appointments to facilitate interventions. **Results:** The table shows all hypertensives at the Washington VAMC, tabulated over a 48-month period. **Conclusions:** A 63% improvement in patients returning to normal ($p < 0.0001$) and 49% in those falling below 160/100 ($p < 0.0001$) occurred with feedback to clinic managers and providers though automated reminders and reports. All patients with hypertension in a medical center can be monitored and improved when vital signs are part of an electronic medical record. Four VAMCs now use this report, allowing analysis between VAMCs. The inter-VAMC report of May aggregated 33,226 patients with 3+ elevated BPs, of whom 49.1% had returned to normal pressures, and 16.6% remained severely elevated. The ability to apply such analysis hospital-wide via electronic vital signs allows unprecedented feedback to primary care providers for the benefit of all patients.

Date	n	Normal	Mild	Severe
Sept-98	3,133	32.2 %	41.1 %	26.7 %
Sept-99	6,507	37.1 %	41.0 %	22.0 %
Sept-00	8,357	42.5 %	38.4 %	19.1 %
Sept-01	9,418	50.7 %	35.3 %	13.9 %
Sept-02	10,745	52.6 %	33.5 %	13.7 %

1058-128 Evaluation of the Extent and Duration of the ABPM Effect in Patients With Essential Hypertension

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Background: While a "white-coat" pressor effect on conventional blood pressure (BP) measurements has been defined and used for the improved evaluation of hypertensive patients, there is limited indication that ambulatory BP monitoring (ABPM) could also influence BP. In that case, 24-hour ABPM would be insufficient for a proper diagnosis of hypertension and evaluation of a patient's response to treatment. Our objective was to further test and quantify the extent and duration of a possible pressor effect due to ABPM.

Methods: We studied 961 mild-to-moderate hypertensive patients (416 men), 53.6±14.2 (mean±SD) years of age. BP and heart rate (HR) were measured every 20 minutes during the day (07:00 to 23:00 hours) and every 30 minutes at night for 48 hours, and physical activity was simultaneously evaluated at 1-minute intervals with a wrist actigraph. Almost half of the patients were evaluated twice or more times. The total number of BP profiles obtained in this study was 1587.

Results: In both treated and untreated hypertensive patients evaluated for the first time, results indicate a highly statistically significant (P<0.001) reduction during the second day of monitoring as compared to the first in the diurnal mean of systolic and diastolic BP, but not in HR or physical activity. This pressor effect increases BP on the average by a significant 7 and 5 mm Hg for systolic and diastolic BP for the first 4 hours of measurement, and it remains statistically significant for the first 10 hours of monitoring, independently of gender, day of the week of monitoring, or number of antihypertensive drugs used by the treated patients. The nocturnal means of BP were, however, similar between both days of sampling. This "ABPM effect" was diminished in extent and duration for suc-